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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/502,313

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Rudolfus Antonius Theodorus Maria Van Benthem

4662-333

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01/24/2008

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EXAMINER

CHEUNG, WILLIAM K

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/502,313	<b>Applicant(s)</b> VAN BENTHEM ET AL.	
	<b>Examiner</b> William K. Cheung	<b>Art Unit</b> 1796	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Request for Continued Examination***

1. The request filed on January 14, 2008 for a Request for Continued Examination (RCE) under 37 CFR 1.53(d) based on parent Application No. 10/502313 is acceptable and a RCE has been established. An action on the RCE follows.
2. In view of the amendment filed January 14, 2008, claims 8-12 have been cancelled. Claims 1-7 are pending.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ulmer et al. (US 5,759,522) in view of Franz et al. (DE 42 36 058 A1) for the reasons adequately set forth from paragraph 5 of the office action August 16, 2007.

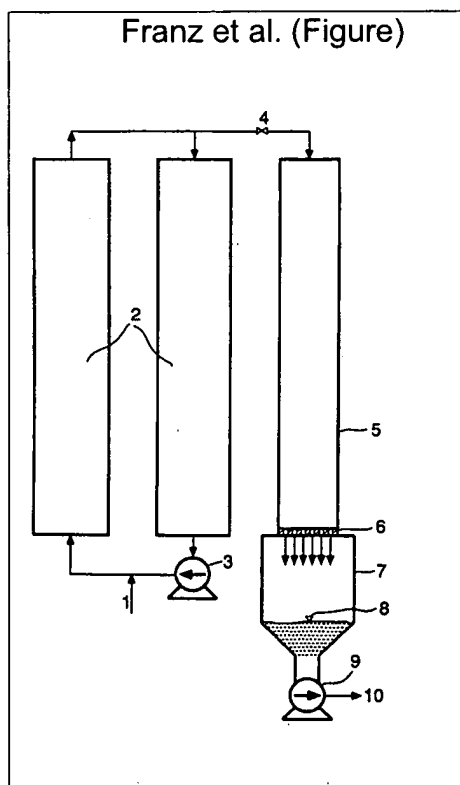
1. (Currently Amended) Process for the preparation of a copolymer of maleic anhydride and an alkyl vinyl ether, comprising the steps of:
- (a) continuously supplying maleic anhydride, ~~an~~ ~~and the~~ alkyl vinyl ether and an initiator, together forming a feed flow, through an inlet to a loop reactor;
  - (b) allowing the ~~wherein~~ maleic anhydride and the alkyl vinyl ether to react within the loop reactor to form a copolymer of maleic anhydride and alkyl vinyl ether ~~which forms in~~ a reaction mixture with the maleic anhydride, the alkyl vinyl ether and the initiator, ~~wherein the process is a continuous process and the reactor is a loop reactor, optionally followed by a post reactor, and wherein the process includes~~
  - (c) internally circulating the reaction mixture within the loop reactor in such a manner that the reaction mixture arrives again at the inlet before the maleic anhydride and alkyl vinyl ether have completely reacted and while a remainder of initiator is still present;
  - (d) withdrawing a part of the reaction mixture from the loop reactor and introducing the withdrawn part of the reaction mixture to a postreactor; and
  - (e) heating the withdrawn part of the reaction mixture within the postreactor to a temperature between 120 and 220°C for a time sufficient to reduce free maleic anhydride content therein to below 10 parts per million, based on the total weight of the reaction mixture.

Ulmer et al. (col. 4, line 10-46) disclose a process for preparing a copolymer of maleic anhydride (MW=98 g/mol) and methyl vinyl ether (MW=58 g/mol), in the presence of an initiator (MW=280.28 g/mol) and acetone (MW=58 g/mol). The MVE/MA

ratio is calculated to be 1.2, which meets the requirement of claim 4. The polymerization reaction is carried out 70-80°C.

Ingredients (g/mol)	MW	Weight (lb)	Weight (g)	mole
MA	98	5225	2370020.133	24183.88
MVE	58	3713	1684188.47	29037.73
Initiator	280.28	209	94800.80533	338.2361
Acetone	58	1033	468560.9182	8078.637
Ratio				
		MA/initiator	71.5	
		MVE/MA	1.200706154	

The difference between the Ulmer et al. and claims 1-7 is that Ulmer et al. are silent on a continuous process for preparing the copolymer of Ulmer et al.



Franz et al. (English Abstract; figure) disclose an apparatus comprising a loop reactor connected through a tube to a post reactor, wherein plug flow dominates. Since Franz et al. (abstract) clearly indicate that the disclosed apparatus is suitable for development of continuous radical bulk polymerization of vinyl monomers containing small amount of solvent and/or initiator to achieve high polymerization conversion with a high space-time yield, it would have been obvious to one of ordinary skill in art to apply the apparatus and process teachings of Franz et al. into Ulmer et al. for preparing a copolymer of maleic anhydride and an alkyl vinyl ether to obtain the process invention of claims 1-7, especially when the disclosed copolymer are incorporated into hair spray application where the cost of production is critical.

Regarding the claimed feature "remainder of initiator is still present", the examiner has a reasonable basis that such feature is inherently possessed in Franz et al. since Franz et al. are silent on a step or apparatus for removing the residual initiators from the disclosed polymerization process. Applicants fail to recognize that Franz et al. clearly involves employing a free radical initiator (col. 5, line 25-26) which inherently possess a half life decomposition temperature. Mathematically, the half-life decomposition characteristics of the peroxide means that the decomposition is fast initially and then slow down as the concentration of the peroxide is lowered or consumed by the polymerization process. Unless Franz et al. disclose the removal of the initiator during the polymerization process, there is not a reasonable basis for any one of ordinary skill in art to believe that the process has consumed all the peroxide or there is no residual initiator in the polymerization process. Therefore, the examiner has

a reasonable basis that the claimed "remainder of initiator is still present" feature is inherently possessed in Franz et al.

Regarding claim 3, although the process as described in Ulmer et al. only disclose a MA/initiator mole ratio of 71.5, motivated by the expectation of success of converting the polymerization process of Ulmer et al. with the continuous polymerization teachings in Franz et al., it would have been obvious to one of ordinary skill in art to perform some "routine optimization" experimental work to optimize the ratio "MA/initiator" of Ulmer et al. to obtain the "MA/initiator" as claimed.

Regarding claim 7, although the process as described in Ulmer et al. do not disclose "the ratio of an internal circulation to the feed flow is at least 15" as claimed, Franz et al. clearly disclose the polymerization process and apparatus as claimed. Motivated by the expectation of success of converting the polymerization process of Ulmer et al. with the continuous polymerization teachings in Franz et al., it would have been obvious to one of ordinary skill in art to perform some "routine optimization" experimental work to optimize "the ratio of an internal circulation to the feed flow is at least 15", to obtain the invention claim 7 as claimed.

Regarding the "subsequent heating of a temperature of between 120 to 220 °C" to reduce the free MA to below 10 parts per million, Ulmer et al. (col. 4, line 32-33) clearly disclose that the residual MA in the final product is substantially absent, which indicates that the claimed "subsequent heating of a temperature of between 120 to 220 °C" is a non-critical step as claimed. To obtain the valid patent, applicants are required

to submit evidence to show the criticality of the claimed "subsequent heating of a temperature of between 120 to 220 °C".

Applicant's arguments filed January 14, 2008 have been fully considered but they are not persuasive. Applicants argue that Franz et al. disclose a process for producing a polymer product having at least 10 weight percent of monomer, and that Ulmer et al. are directed to reducing the VOC of hair spray. Therefore, applicants believes that Franz et al. and Ulmer et al. not combinable because they are non-analogous art to each other. However, the examiner disagrees because both prior art are related to a copolymer of maleic anhydride and alkyl vinyl ether.

Regarding applicants' argument that if the temperature is not increased in the fashion as argued, the maleic acid would not decrease to the desired level or the reactor size would need to be uneconomically large to achieve a sufficient residence time for the desired residual maleic acid level to be achieved. Applicants fail to provide any evidence to support such argument.

Regarding applicants' argument that Franz et al. teach one of ordinary skill in art to increase temperature in the post reactor, which is an adiabatic process, to promote an improved molecular weight distribution, rather than driving the maleic acid to residual levels as defined in applicants' claims, however, applicants fail to provide any evidence that the increase temperature in the post reactor of Franz et al. would not reduce the residual maleic acid or maleic anhydride in Franz et al.

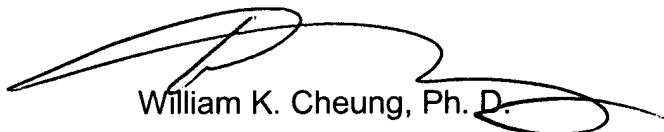


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William K. Cheung whose telephone number is (571) 272-1097. The examiner can normally be reached on Monday-Friday 9:00AM to 2:00PM; 4:00PM to 8:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David WU can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



William K. Cheung, Ph. D.

Primary Examiner

January 20, 2008